

Claims

[c1] An apparatus for positioning a key blank relative to a key cutter, comprising:

- a frame having an axis;

- a carriage assembly attached to the frame and arranged for movement in a generally axial direction and a generally transverse direction relative to the axis;

- a key blank holder attached to the carriage assembly;

- a drive assembly coupled to the carriage assembly for moving it in the generally transverse direction, having operable and inoperable conditions; and

- a bias assembly having operable and inoperable conditions, wherein in a first operational mode, the bias assembly is inoperable, and the drive assembly is operable to impart transverse movement to the carriage assembly, and in a second operational mode, the bias assembly is operable to bias the carriage assembly toward the key cutter, and the drive assembly is inoperable.

[c2] The apparatus of claim 1, wherein drive assembly includes:

a support shaft positioned in an opening on the frame; and
a knob attached to the support shaft, wherein the knob is engageable with the carriage assembly to impart transverse movement to the carriage assembly.

[c3] The apparatus of claim 2, wherein the bias assembly includes a pin moveably attached to the knob, and in the first operational mode, the pin is disengaged from the carriage assembly and the knob is arranged to impart transverse movement to the carriage assembly, and in the second operational mode, the pin is engaged with the carriage assembly and biases the carriage assembly toward the key cutter.

[c4] The apparatus of claim 3, further comprising a handle moveably connected to the knob, wherein the pin has a first end connected to the handle and a second end for engagement with the carriage assembly.

[c5] The apparatus of claim 4, wherein the pin is disposed in a channel formed in the knob.

[c6] The apparatus of claim 5, further comprising a biasing spring having a first end attached to the pin near the second end and a second end engaged with a sidewall of

the channel such that the biasing spring directs the pin toward the carriage assembly.

[c7] The apparatus of claim 6, wherein the handle is adjustable from a first position, corresponding to the first mode of operation, in which the handle retracts the pin into the channel, and a second position, corresponding to the second mode of operation, in which the handle and the biasing spring cooperate to extend the pin from the channel into engagement with the carriage assembly.

[c8] The apparatus of claim 1, wherein the carriage assembly includes:

- a first body member; and

- a first shaft having one end connected to the first body member, and being rotatably and slidably disposed in an opening located on the frame.

[c9] The apparatus of claim 8, wherein the key blank holder is attached to the first body member.

[c10] The apparatus of claim 9, wherein the carriage assembly further comprises:

- a second body member; and

- a second shaft connecting the second body member to the first body member.

[c11] The apparatus of claim 10, further comprising a key

holder attached to the second body member.

- [c12] The apparatus of claim 11, further comprising a key tracer mounted to the frame, wherein in the second mode of operation the key tracer and a key in the key holder cooperate with the bias assembly to control the transverse movement of the carriage assembly.
- [c13] The apparatus of claim 10, wherein the carriage assembly further comprises a third shaft having one end attached to the first body member and another end attached to the second body member.
- [c14] The apparatus of claim 13, further comprising:
 - a plunger moveably attached to the frame, wherein in the first mode of operation, the third shaft engages the plunger, which provides an indication of an axial position of the carriage assembly relative to the frame.
- [c15] The apparatus of claim 14, further comprising a slide member positioned on the third shaft, wherein in the first mode of operation, the slide member is positioned in engagement with the plunger, and in the second mode of operation, the slide member is positioned in disengagement with the plunger.
- [c16] The apparatus of claim 1, wherein the drive assembly in-

cludes a lock pin and the frame includes a detent located thereon, and the drive assembly is disengaged through engagement of the lock pin with the detent in the frame.

[c17] An apparatus for positioning a key blank relative to a key cutter, comprising:

- a frame having an axis;

- means for connecting the key blank to the frame such that the key blank is moveable in a generally axial direction and a direction generally transverse to the axis;

- means for biasing the key blank toward the key cutter, the biasing means having operable and inoperable conditions; and

- means for driving the connecting means, the driving means having operable and inoperable conditions, wherein in a first operational mode, the biasing means is inoperable, and the driving means is operable to impart transverse movement to the connecting means, and in a second mode of operation the driving means is inoperable and the biasing means biases the connecting means toward the key cutter.

[c18] The apparatus of claim 17, wherein the connecting means includes a means for holding the key blank.

[c19] The apparatus of claim 18, wherein the connecting

means further comprises means for holding a key to be duplicated.

[c20] The apparatus of claim 19, further comprising means for cooperating with the key to be duplicated, in the second mode of operation, to control the transverse movement of the connecting means.

[c21] The apparatus of claim 19, wherein the connecting means further comprises means for attaching the key blank holding means and the key holding means.

[c22] The apparatus of claim 21, wherein the attaching means includes:

means for engaging a depth plunger located on the frame; and

means for engaging the driving means.

[c23] The apparatus of claim 22, wherein the means for engaging the depth plunger comprises a slide member adjustable from a first position in which it contacts the depth plunger and a second position in which it does not contact the depth plunger.

[c24] The apparatus of claim 17, wherein the driving means includes means for engaging the connecting means when in the first mode of operation and means for engaging the connecting means when in the second mode

of operation..

[c25] The apparatus of claim 17, wherein the driving means includes locking means for preventing adjustment of the driving means.

[c26] The apparatus of claim 17, further comprising:
a means for selecting between the first operational mode and the second operational mode.

[c27] A method of using a key cutting machine, comprising:
inserting the key blank in a key blank holder positioned on a carriage assembly arranged for generally axial movement and generally transverse movement with respect to an axis of a frame to which the carriage assembly is mounted,
selecting between a first operational mode for the key cutting machine, wherein a drive assembly is operational to move the carriage assembly transversely and a bias assembly, for biasing the carriage assembly toward the key cutter, is not operational, and a second operational mode, wherein the drive assembly is not operational, and the bias assembly is operational,
positioning the key blank relative to the key cutter in the selected operational mode.

[c28] The method of claim 27, wherein the step of selecting an operational mode includes:

selecting the first operational mode through disengagement of the bias assembly by retracting a pin in engagement with the carriage assembly.

[c29] The method of claim 28, wherein the step of positioning includes:

rotating a depth control cam to transversely move the carriage assembly.

[c30] The method of claim 27, wherein the step of selecting an operational mode includes:

selecting the second operational mode by arresting rotation of a depth control cam by depressing a lock pin located on the depth control cam such that the lock pin engages a corresponding detent on the frame of the key cutting machine.

[c31] The method of claim 27, wherein the step of selecting an operational mode includes:

selecting the second operational mode through engagement of the bias assembly by positioning a pin in engagement with the carriage assembly.

[c32] The method of claim 31, further comprising:

inserting a key to be copied into a key holder on the

carriage assembly,
engaging the key to be copied with a key tracer,
rotating a space control cam to move the carriage
assembly axially.

- [c33] A key cutting machine having a duplication mode and a code cutting mode, comprising:
- a frame;
 - a key cutter mounted to the frame;
 - a carriage moveably attached to the frame;
 - a key blank holder positioned on the carriage;
 - a gauge mounted to the frame that measures a location of the carriage assembly relative to the key cutter; and
 - an engagement member moveably attached to the carriage, wherein the engagement member is moveable between a first position, corresponding to the code cutting mode, in which it engages the gauge, and a second position, corresponding to the duplication mode, in which it is disengaged from the gauge.